C L A I M S

1. A heterostructure bipolar transistor characterized in that constituent devices of a compound semiconductor forming a base layer contain at least Ga, As, and Sb, and constituent devices of a compound semiconductor forming an emitter layer contain at least In, Al, and P.

2. A heterostructure bipolar transistor according to claim 1, characterized by comprising:

a substrate made of InP;

a collector layer formed on said substrate and made of a compound semiconductor containing indium and phosphorus;

said base layer formed on said collector layer and made of a p-type compound semiconductor containing gallium, arsenic, and antimony; and

said emitter layer formed on said base layer and made of an n-type compound semiconductor containing indium, aluminum, and phosphorus,

wherein a composition ratio of indium to aluminum in said emitter layer is in a range within which a potential energy, in a conduction band edge on a side of said base layer, of said emitter layer is not less than that in a conduction band edge of said base layer.

3. A heterostructure bipolar transistor according to claim 1, characterized in that at least one

$GaAs_{(x)}Sb_{(1-x)}$ layer is used in said base layer, at least one $In_{(1-y)}Al_{(y)}P$ layer is used in said emitter layer, and x and y represent mixed crystal compositions and fall within ranges of $0 < x < 1$ and $0 < y < 1$, respectively.

4. A heterostructure bipolar transistor according to claim 3, characterized in that the range of the composition x is $0.2 \leq x \leq 0.8$, and the range of the composition y is $0 < y \leq 0.5$.

5. A heterostructure bipolar transistor according to claim 4, characterized in that a relationship between x and y is $0.49x + 1.554y \geq 0.25$.

6. A heterostructure bipolar transistor according to claim 5, characterized in that the ranges of the compositions x and y are $0.45 \leq x \leq 0.55$ and $0 < y \leq 0.25$, respectively, and the relationship between x and y is $0.49x + 1.554y \geq 0.36$.

7. A heterostructure bipolar transistor according to claim 1, characterized in that the composition ratio of Al in said emitter layer decreases away from said base layer.

8. A heterostructure bipolar transistor according to claim 1, characterized in that the composition ratio of As in said base layer decreases away from said emitter layer.

9. A heterostructure bipolar transistor according to claim 1, characterized in that said collector layer is made of a compound semiconductor

containing indium, aluminum, and phosphorus.

10. A heterostructure bipolar transistor according to claim 9, characterized in that

said base layer is made of $GaAs_{(x)}Sb_{(1-x)}$,

said collector layer is made of $In_{(1-z)}Al_{(z)}P$, and

x and z represent mixed crystal compositions and fall within ranges of $0 < x < 1$ and $0 < z < 1$, respectively.

11. A heterostructure bipolar transistor according to claim 10, characterized in that

the range of the composition y is $0 < y \leq 0.18$, and

the relationship between x and y is $0.49x + 1.554z \leq 0.36$.

12. A heterostructure bipolar transistor according to claim 9, characterized in that the composition ratio of Al in said collector layer decreases away from said base layer.

13. A heterostructure bipolar transistor according to claim 1, characterized in that

layers including said base layer and emitter layer forming the heterostructure bipolar transistor are formed by metal organic chemical vapor deposition, and

carbon is doped as a dopant to said base layer.

14. A heterostructure bipolar transistor

according to claim 13, characterized in that said base layer is formed at a growth temperature of not less than 480°C.